The German Regulatory Concept of Transport Package Design Approval for Dual Purpose Casks

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Workshop on the Development and Application of a Safety Case for Dual Purpose Casks for Spent Nuclear Fuel, Vienna, 19 to 21 May 2014
The German regulatory concept for dual purpose casks

- Dual purpose cask (DPC)
  - for dry transport and storage of spent nuclear fuel or vitrified high level radioactive waste
- Transport regulations consistent with TS-R-1/SSR-6
- Type B(U)F transport package design approval
  - (prerequisite for storage license)
- Interim storage facility license
  - (transportability of DPC required)
- National legislation and guideline for interim storage

Regulatory concept
Challenge: How to ensure that DPCs can be transported in compliance with the transport regulations after decades of interim storage?
Overview on procedure

DPCs manufactured, loaded and transported to storage facility

Interim storage up to 40 years

Transport from the storage facility

D/1234/B(U)F-96 (Rev.0)

• 5 year validity period
• design meets transport and storage requirements
• safety related long term aspects considered
• instructions for retesting before transport
• normal revision and renewal procedure
DPC package design approval before storage

Specific aspects resulting from the use of the package as a storage cask:

• The package design must meet the safety criteria for transport and interim storage.

• The long term behaviour of safety related material properties and safety functions of the package design has to be considered as far as possible in the assessment of the package design for storage as well as for transport. Credit can be taken from the well known conditions of the dry atmosphere inside the cask and of the environment within the interim storage facility.

• As part of the quality assurance documents there have to be developed plans for repeated testing of the loaded package before transport from the storage facility to confirm that the package still complies with all provisions of the package design certificate after the interim storage period.

Approval certificate valid for 5 years, can be revised and extended
Overview on procedure

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Interim storage up to 40 years

Transport from the storage facility

D/1234/B(U)F-96 (Rev.0)
• 5 year validity period
• design meets transport and storage requirements
• safety related long term aspects considered
• instructions for retesting before transport
• normal revision and renewal procedure

D/1234/B(U)F-96 (Rev.X)
• 10 year validity period
• within this period impact assessment of changes in regulations, state of the art of safety demonstrations, operational experiences, ageing effects
• update of instructions for retesting before transport
• certificate renewal procedure every 10 years
**Maintenance of the DPC transport package design approval during interim storage period**

When all DPCs are loaded BfS issues the package design certificate with a validity period of 10 years with the following actions required:

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<tr>
<th>Date</th>
<th>Action</th>
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<tr>
<td>Every time new transport regulations come into force</td>
<td>Evaluate if the changes in regulations will affect the safety analysis report the certificate is based on. This assessment has to be documented and sent to the competent authorities BfS and BAM.</td>
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<td>5 years after issuing the transport package design approval certificate</td>
<td>Provide to BfS and BAM an assessment report to confirm that all safety related technical provisions, specifications and safety demonstrations the safety analyses report is based on are still valid.</td>
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Main aspects of impact assessment every 5 years

Assessment of the impact on the package design safety analysis report resulting from

• the state of the art of technology, technical standards and methods of safety demonstrations
• operational experience during storage
• latest knowledge of ageing effects during storage

If deficiencies are identified appropriate measures have to be derived, documented and included

• in the package design approval certificate and/or
• in the plan for repeated testing of the loaded cask before transport
Overview on procedure

DPCs manufactured, loaded and transported to storage facility

- D/1234/B(U)F-96 (Rev.0)
  - 5 year validity period
  - design meets transport and storage requirements
  - safety related long term aspects considered
  - instructions for retesting before transport
  - normal revision and renewal procedure

- Interim storage up to 40 years

- D/1234/B(U)F-96 (Rev.X)
  - 10 year validity period
  - within this period impact assessment of changes in regulations, state of the art of safety demonstrations, operational experiences, ageing effects
  - update of instructions for retesting before transport
  - certificate renewal procedure every 10 years

- Transport from the storage facility

- D/1234/B(U)F-96 (Rev.Z)
  - valid package design approval
  - before transport: performance of all measures as specified in the instructions for repeated testing or in the certificate
  - supervision by entitled expert organization
  - transport to final destination in compliance with regulations
Transport of DPCs from the storage facility

Measures for all DPCs before transport from the interim storage facility include:

- Inspection of the records of the leak-tightness supervision system during storage
- Check of all cask related documents for completeness and consistency including the package design approval certificate
- Visual inspection of the cask
- Inspection of the containment system and leak-tightness test
- Inspection of the trunnions including tests
- Performance of additional measures as derived from the periodical review process during the interim storage period and documented in the certificate and/or in the plan for repeated testing

Supervision of all measures by BAM or other entitled expert organisation
**Summary and conclusions**

**DPCs manufactured, loaded and transported to storage facility**

- During transport package design approval consideration of safety related long term aspects
- Development of instructions for retesting before transport

**Interim storage up to 40 years**

- Maintaining the transport package design approval during the whole storage period (renewal every 10 years)
- Assessment of impact of changes in IAEA transport regulations max. 6 months after enactment of new regulations
- Assessment of the impact of state of the art of technology and safety demonstrations, operational experience and ageing effects 5 years after each renewal of the certificate, subject to competent authority approval
- Update of instructions for retesting before transport according to these assessments

**Transport from the storage facility**

- Valid package design approval
- Before transport: performance of all measures as specified in the instructions for repeated testing or in the certificate, supervision by entitled expert organization
Summary and conclusions

This concept provides a well documented and monitored process during interim storage which assures the transport of the DPCs from the facility in compliance with the applicable transport regulations after interim storage.

The concept relies on essentially stable transport regulations, known storage conditions, the process of monitoring and maintenance to the DPC and the package design safety analysis report for the DPC and repeated testing of the loaded DPC before transport under supervision of entitled expert organization before transport from the interim storage facility.

First practical experience with this concept has shown good results.

Regarding the IAEA Transport Regulations SSR-6 and the Advisory Material TS-G-1.1 discussion has started if the case of storage of a transport package for several years before transport needs additional consideration regarding safety demonstration and management system.